

## RESEARCH ARTICLE

# A new 'horned' *Stenocercus* from the highlands of southeastern Brazil, and redescription of *Stenocercus tricristatus* (Reptilia: Tropiduridae)

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**ABSTRACT.** A new species of the lizard genus *Stenocercus* Duméril & Bibron, 1837 is described based on six specimens from Serra da Canastra, Minas Gerais, southeastern Brazil. Similar to *S. tricristatus* (Duméril, 1851), *S. dumerilii* (Steindachner, 1867), *S. quinarius* Nogueira & Rodrigues, 2006, and *S. squarrosus* Nogueira & Rodrigues, 2006, the new species has a pyramidal head and an enlarged, dorsally projected post-supraciliary scale, like a small horn. It is most similar to *S. tricristatus*, from which it differs in having a more elongated head in ventral view; a larger number of scales around midbody; a distinctly enlarged, smooth preauricular scale; and probably a larger body size. Moreover, the new species has distinctly keeled scales, with phylloid and mucronate dorsals; no enlarged supraoculars; no neck folds; a vertebral, and a pair of dorsolateral and (weak) lateral crests. A redescription of *S. tricristatus* is presented for comparison with the new species.

**KEY WORDS.** Minas Gerais, new species, Serra da Canastra, Squamata, taxonomy.

## INTRODUCTION

The enigmatic *Stenocercus tricristatus* was originally described by A. Duméril (Duméril and Duméril 1851) as the type-species of *Ophryoessoides*. Genus and species were based on a single specimen from "Brésil", collected by M. Claussen. A short characterization of the genus and species also was given in Duméril et al. (1854). Subsequently, Duméril (1856) complemented the description of *S. tricristatus* with a color drawing of the animal on a rocky substrate, thereby illustrating its color pattern in detail (Fig. 1). *Ophryoessoides dumerilii* Steindachner, 1867 was likewise described on the basis of a single specimen from Pará, northern Brazil, but Etheridge (in Peters and Donoso-Barros 1970) referred it as a synonym of *O. tricristatus*. The former taxon remained poorly known until Cunha (1981) published a study based on several specimens from eastern Pará. Ávila-Pires (1995), however, examining the holotypes of both species, demonstrated that these two taxa, by then referred to *Stenocercus* Duméril & Bibron, 1837 (Frost 1992), corresponded to distinct species. Taking into account where M. Claussen lived and traveled, Ávila-Pires (1995) suggested that *S. tricristatus* probably would occur in Minas Gerais, southeastern Brazil. Torres-Carvalho (2007a), in a taxonomic revision of the genus, compared *S.*

*tricristatus* with all other congeners and presented a description based on the literature and on data provided by R. Etheridge.

During field trips to Serra da Canastra, Minas Gerais, six lizards were collected that at first we thought belonged to *S. tricristatus* (Figs 2, 3). Considering that Nogueira and Rodrigues (2006) described two other species, *S. quinarius* Nogueira & Rodrigues, 2006 and *S. squarrosus* Nogueira & Rodrigues, 2006, from central and northeastern Brazil, with the characteristic pyramidal head and enlarged, dorsally projected post-supraciliaries present in *S. dumerilii* and *S. tricristatus*, we performed a comparison with these four species (from here on referred to as the 'horned *Stenocercus*'). Our data showed that, although the specimens from Serra da Canastra are most similar to *S. tricristatus*, they also show some significant differences and represent clearly a distinct species, described here. In order to facilitate comparisons, we also present a redescription of the holotype of *S. tricristatus*.

## MATERIAL AND METHODS

Specimens were collected during field trips to Serra da Canastra National Park (20°04'32.73" to 20°39'50.91"S, 46°12'17.87" to 46°59'56.54"W), state of Minas Gerais, southeastern Brazil (collection permit IBAMA 02027.008026/03-68,



Figures 1–3. (1) Drawing of *Stenocercus tricristatus* from Plate XXII in Duméril (1851); (2) photograph (by O.A.V. Marques) of a live adult specimen of *Stenocercus canastra* sp. nov. (holotype, MZUSP 88873); (3) photograph (by CCN) of a live juvenile specimen of *S. canastra* sp. nov. (MZUSP 94456).

03/2003 to CCN). Direct comparisons were made with other four species of horned *Stenocercus*: *S. tricristatus*, *S. dumerilii*, *S. quinarius*, and *S. squarrosus*. The holotype and only known specimen of *S. tricristatus* was examined by TCSAP and CCN. Data on *S. dumerilii* are based on MPEG 6031–6037, MPEG 7376–7377, MPEG 7382–7383, MPEG 7386, RMNH 28047, 28048, 28049 (former MPEG 6089, 7324, 7330, respectively) and on Ávila-Pires (1995). Data on *S. quinarius* and *S. squarrosus* refer to the type series. For comparisons with other *Stenocercus* species, data were taken from the literature (Cadle 1991, 2001, Torres-Carvajal 2005, 2007a). We used the museum acronyms listed in Sabaj-Perez (2013).

To define the species we applied the 15 sets of characters and the character terminology used by Cadle (1991). Additionally to these 15 sets, we also used the following two sets of features: 1) number of scales around midbody and number of ventrals between the anterior margin of forelimbs and the anterior margin of hind limbs, and 2) shape of the scale bordering the anterior portion of the ear opening. Description follows Ávila-Pires (1995), with some additional characters added from Cadle (1991; internasals counted immediately posterior to postrostrals, number of supraoculars in a transverse line across the greatest width of one of the orbits, angulate temporals, number

of gular scales between ventral edges of ear-openings). All measurements were taken from the specimens after preservation. Snout-vent length (SVL) and tail length were measured with a ruler to the nearest 1 mm, whereas all other measurements were taken with an electronic caliper, to the nearest 0.1 mm. Head length was measured from the tip of the snout to the anterior border of the ear-opening; head width at the widest point of the head; head height at highest mid-dorsal point (prominent scales on canthal-supraciliary crests not considered). Limb length was measured from axil/groin to tip of claw of longest digit. Lamellae under fourth finger and fourth toe were counted on left side.

A Principal Components Analysis (PCA) was performed in PAST (version 3.04 for Mac; Hammer et al. 2001) to compare the new species with other horned *Stenocercus*. Of the 27 meristic and morphometric characters obtained, we used the only 11 that had a normal or almost normal distribution ( $p > 0.025$  in Shapiro-Wilk normality test). In order to eliminate the influence of size on the comparisons, for the eight morphometric characters we used the residuals of regressions of the variable and head length (for head measurements) or SVL (for all other measurements). Characters included were relative tail length, relative head width, relative head height, relative leg length, relative body height, relative body width, relative tail height, relative tail width, scales around midbody, longitudinal ventrals, and infradigital lamellae under fourth toe. As juveniles tend to show differences in morphology in relation to adults, we used a different symbol for the only young specimen from Serra da Canastra in the PCA biplot. Since our variables showed different scales, the PCA was based on a correlation matrix (after normal-

izing all variables by dividing them by their standard deviations – Hammer et al. 2001).

## TAXONOMY

Comparison between the specimens from Serra da Canastra and the four other horned *Stenocercus* species showed several differences. Among them were body shape, tail shape and length, distinctions on some of the scales on head and body, and color pattern (Table 1). The first four axes of the PCA explained 71.0% of the variance in the data. Axes 1 and 2 explained 49.3% of total variation and were able to almost completely separate the groups, except for *S. quinarius* and *S. squarrosus* that showed a larger overlap (Fig. 4). However, these two species differ in a number of characters not included in the PCA (Table 1). The most important variables in component 1 were relative tail length, scales around midbody, relative tail height, longitudinal ventrals, and relative body width, whereas in component 2, they were relative body height, lamellae under fourth toe, relative tail width, relative tail height, and relative head width (Table 2). Along axis 1, the group formed by the Serra da Canastra specimens is well separated from *S. quinarius*, *S. squarrosus*, and *S. dumerilii*, whereas the single specimen of *S. tricrostatus* appears well separated from the Serra da Canastra specimens, on the highest values of axes 1 and 2, especially the former. These comparisons (Tables 1, 2 and Fig. 4) demonstrate that the specimens from Serra da Canastra cannot be attributed to any of the known taxa and represent a new species, which we describe below.

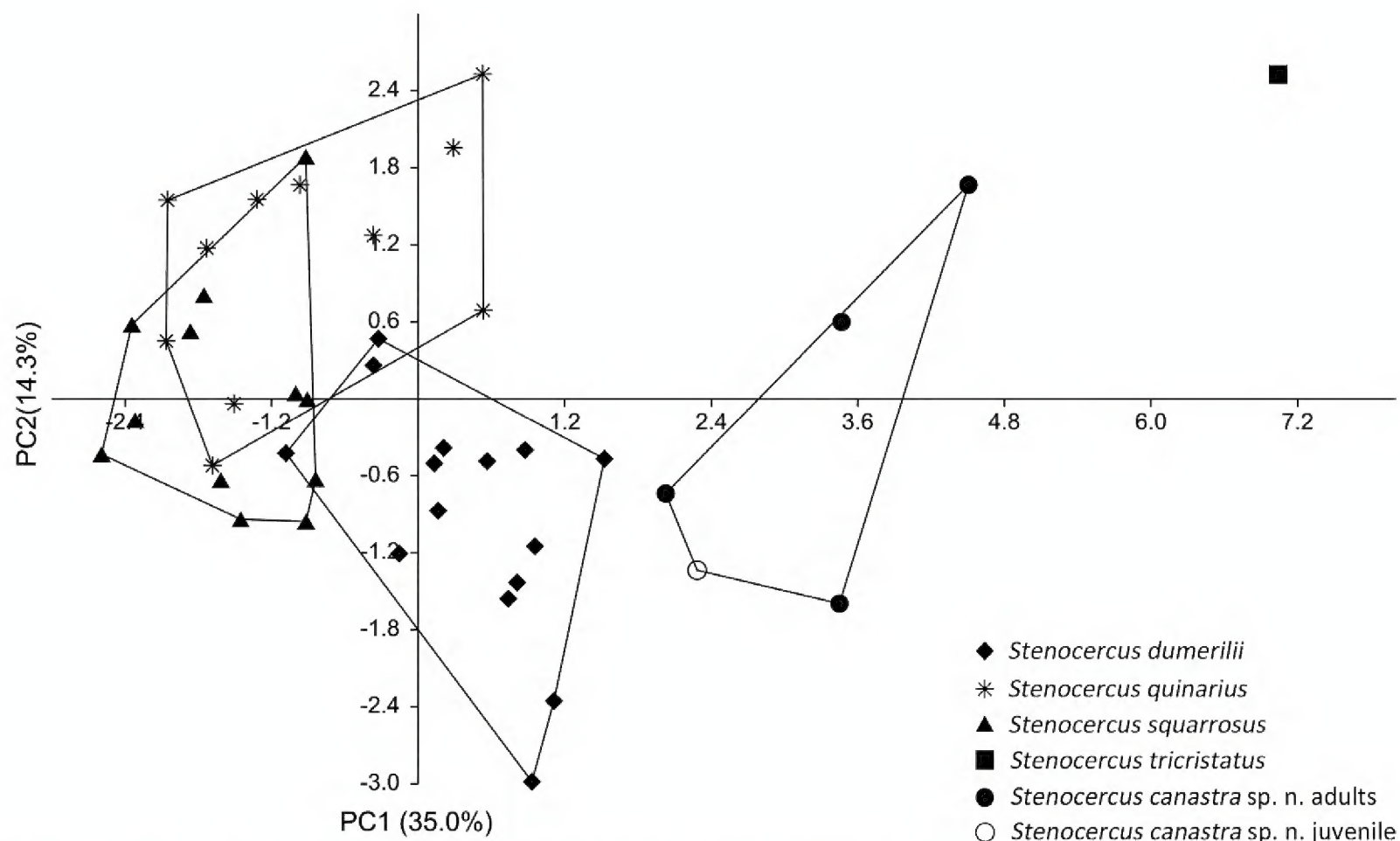


Figure 4. Plot of axis 1 versus axis 2 from Principal Component Analysis comparing the five horned *Stenocercus* species.

Table 1. Comparison between the five horned *Stenocercus* species (n = number of specimens). \*A low crest on flanks, between dorsolateral and lateral crests.

|                               | <i>S. canastra</i> (n = 6)                            | <i>S. tricrostatus</i> (n = 1)                    | <i>S. dumerilii</i> (n = 15)              | <i>S. quinarius</i> (n = 11)                      | <i>S. squarrosus</i> (n = 12)                         |
|-------------------------------|-------------------------------------------------------|---------------------------------------------------|-------------------------------------------|---------------------------------------------------|-------------------------------------------------------|
| SVL in adult males            | 70–77 mm                                              | 58 mm                                             | 84–104 mm                                 | 65–75 mm                                          | 76–88 mm                                              |
| Body shape                    | Slightly depressed                                    | Slightly compressed                               | Depressed                                 | Depressed                                         | Strongly depressed                                    |
| Tail shape                    | Nearly cylindrical to slightly compressed             | Compressed near base, cylindrical distally        | Depressed near base, cylindrical distally | Depressed near base, cylindrical distally         | Depressed, blunt and thick toward end                 |
| Tail length/SVL               | 1.4–1.8                                               | 1.7                                               | 1.2–1.4                                   | 1.0–1.1                                           | 0.8–0.9                                               |
| Head shape ventrally          | Elongated, neck distinct                              | Broad, neck distinct                              | Elongated, neck poorly distinct           | Elongated, neck poorly distinct                   | Elongated, neck poorly distinct                       |
| Interparietal                 | Large                                                 | Large                                             | Small                                     | Large                                             | Large                                                 |
| Supraciliaries in dorsal view | 2 (rarely 3)                                          | 2                                                 | 4 (rarely 3)                              | 4                                                 | 4                                                     |
| Preauricular scale            | Enlarged, projecting, smooth                          | Not enlarged, projecting, keeled                  | Not enlarged, not projecting              | Not enlarged, only slightly projecting            | Not enlarged, only slightly projecting                |
| Mental scales                 | Subequal                                              | Subequal                                          | Anterior ones distinctly smaller          | Anterior ones distinctly smaller                  | Anterior ones distinctly smaller                      |
| Vertebral crest               | Prominent, serrate, to proximal part of tail          | Prominent, serrate, tail?                         | Low, not on tail                          | Low (slightly serrated ant.), to base of tail     | Low, to base of tail                                  |
| Dorsolateral crest            | Prominent, serrate, to base of tail                   | Prominent, serrate                                | Low, not on tail                          | Low or serrate, to base of tail; stronger on neck | Prominent, serrate, to base of tail; stronger on neck |
| Lateral crests                | Visible, but less conspicuous in 2 out of 6 specimens | Uncertain, but apparently absent                  | Low, may be rather inconspicuous          | Serrate, stronger on neck                         | Serrate, very strong on neck                          |
| Mid-lateral crest*            | Absent                                                | Absent                                            | Present, variable in extension            | Absent                                            | Absent                                                |
| Dorsals                       | High keels, mucronate                                 | High keels, mucronate                             | Low keels, not or hardly mucronate        | Low keels, not or hardly mucronate                | Low keels, not or hardly mucronate                    |
| Dorsals at midbody            | 8–9                                                   | 7–8                                               | 11–14                                     | 13–15                                             | 13–15                                                 |
| Scales at midbody             | 39–41                                                 | 33                                                | 41–50                                     | 47–56                                             | 47–53                                                 |
| Color pattern                 | Back and flanks densely covered by bands/blotches     | Back and flanks densely covered by bands/blotches | Back with sparse blotches or uniform      | Uniform or some sparse blotches on back           | Back with sparse blotches or uniform                  |

Table 2. Results from Principal Component Analysis comparing the five horned *Stenocercus* species, including factor loadings, eigenvalues, and the percent variance explained by the five first components. Highest factor loadings in components 1 and 2 are shown in bold.

|                                    | PC 1             | PC 2            | PC 3       | PC 4      | PC 5      |
|------------------------------------|------------------|-----------------|------------|-----------|-----------|
| Relative tail length               | <b>0.464910</b>  | -0.043799       | 0.1314000  | -0.024299 | 0.177340  |
| Relative head width                | 0.221170         | 0.285550        | 0.2435400  | 0.548100  | -0.025339 |
| Relative head height               | 0.058938         | 0.248490        | 0.5807400  | -0.121060 | -0.646790 |
| Relative leg length                | 0.285790         | -0.060514       | 0.2099100  | -0.359920 | 0.073845  |
| Relative body height               | -0.043074        | <b>0.480880</b> | 0.4335200  | -0.056876 | 0.587490  |
| Relative body width                | <b>-0.345650</b> | 0.229540        | -0.0059336 | 0.047379  | 0.320150  |
| Relative tail height               | <b>0.365020</b>  | <b>0.381700</b> | -0.2947500 | -0.080645 | -0.043359 |
| Relative tail width                | 0.218990         | <b>0.414650</b> | -0.4548700 | 0.315760  | -0.124840 |
| Scales around midbody              | <b>-0.440310</b> | 0.135830        | -0.0236180 | -0.026822 | -0.030189 |
| Longitudinal ventrals              | <b>-0.364530</b> | 0.119990        | 0.0792200  | 0.329860  | -0.226500 |
| Lamellae under 4 <sup>th</sup> toe | 0.143220         | <b>-0.46554</b> | 0.2313100  | 0.577570  | 0.163700  |
| Eigenvalues                        | 3.846870         | 1.575790        | 1.3274500  | 1.065050  | 0.800367  |
| % variance explained               | 34.97200         | 14.32500        | 12.0680000 | 9.682300  | 7.276100  |

*Stenocercus canastra* sp. nov.

<http://zoobank.org/3056B5B9-676D-41ED-B95E-A48FDB239241>

*Stenocercus* cf. *tricristatus*; Teixeira et al. 2016: 411, 413.

Type material. Holotype. MZUSP 88873 (Fig. 2), an adult male, from Brazil, Minas Gerais: São Roque de Minas municipality, Parque Nacional da Serra da Canastra (PNSC), at the beginning of the road to Casca D’Anta waterfall, 20°14’38” S, 46°32’56” W, ca 1410 m. Paratypes. Four specimens from the type-locality: MZUSP 88874, a half-grown male; MZUSP 88875, a female; MPEG 31738, a male; and MNHN 2014.0061, a male. One juvenile, MZUSP 94456, also from PNSC, Chapadão da Zagaia, 20°09’58”S, 46°41’54” W, ca 1350 m (Fig. 3).

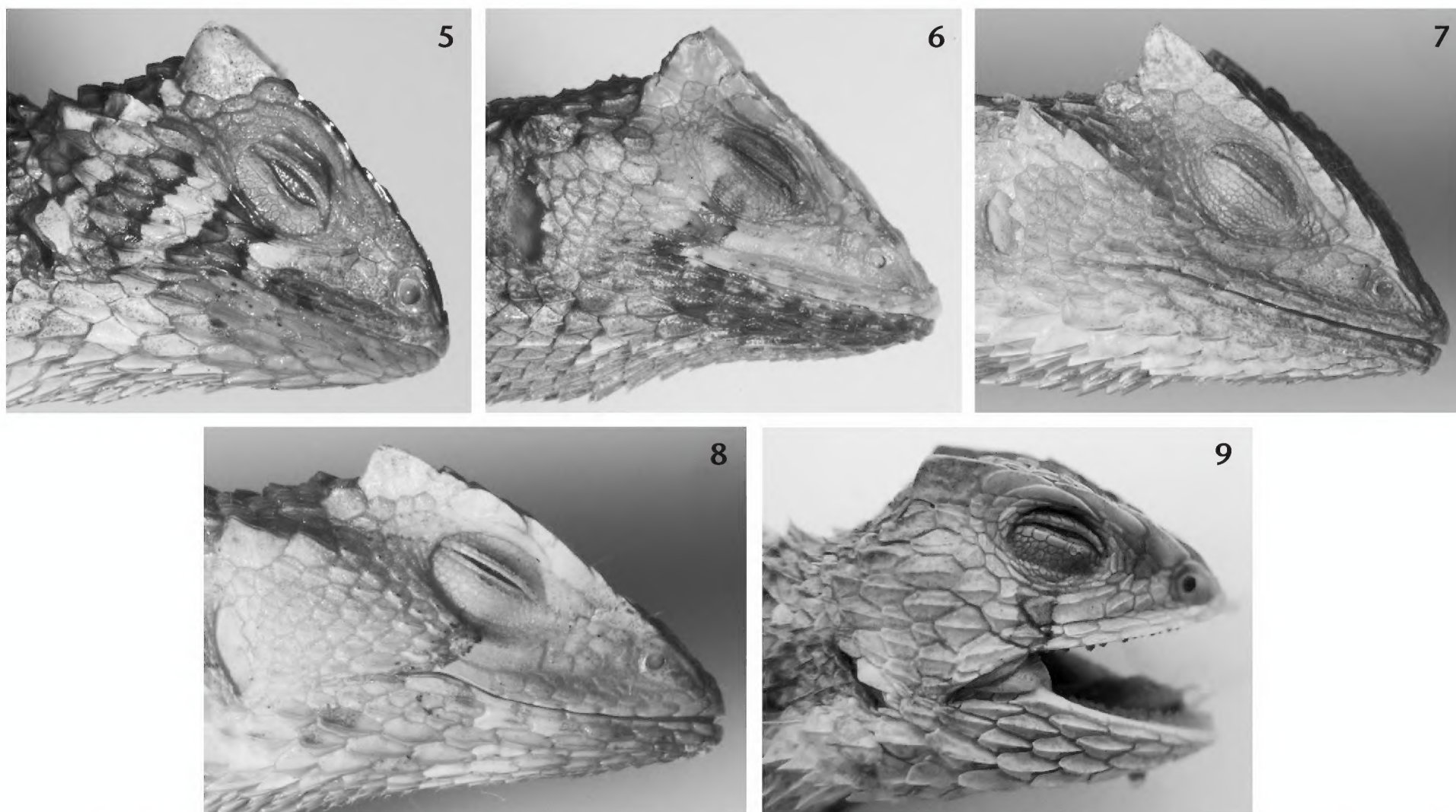
Diagnosis. *Stenocercus canastra* sp. nov. is characterized by the following combination of features: (1) Dorsal head scales keeled. (2) Interparietal distinct, moderately enlarged; parietals about as large as, or smaller than interparietal; postparietals large, with a prominent keel; other posterior head scales variable in size. (3) Internasals six. (4) No distinctly enlarged supraoculars, but medial ones larger than lateral ones; all with pronounced keels. (5) An enlarged canthal on each side, in contact anteriorly with two elongate scales that form a double canthal ridge. (6) An enlarged, prominent, pointed scale immediately posterior to supraciliaries; no projecting, blade-like, angulate temporal scales. (7) Gulars and ventrals distinctly keeled. (8) Parietal eye distinct. (9) Neck folds absent. (10) Dorsals phylloid, keeled, mucronate, and imbricate; scales on flanks similar to dorsals. (11) A prominent serrate vertebral crest, a slightly less prominent dorsolateral crest, and an even less prominent lateral crest. (12) Mite pockets absent. (13) Scales on posterior surface of thighs imbricate, keeled. (14) Tail nearly cylindrical to moderately compressed, verticils absent. (15) Dorsal coloration with numerous, bold, dark brown rhomboid marks forming a

longitudinal series on back, and dark brown vertical bands on flanks; head with at least a dark brown spot between nostrils, and a large, rhomboid spot between eyes; no sexual dimorphism in color pattern. (16) Scales around midbody 39–41, ventrals between anterior margin of forelimbs and anterior margin of hind limbs 25–28. (17) Ear opening bordered anteriorly by a distinctly enlarged, smooth scale. *Stenocercus canastra* sp. nov. is distinguished from all other *Stenocercus* except *S. dumerilii*, *S. tricristatus*, *S. quinarius* and *S. squarrosus* by the presence of an enlarged, prominent post-supraciliary scale (Figs 5–9); from all others except *S. tricristatus*, *S. quinarius* and *S. squarrosus* by a moderately enlarged interparietal (although not as large as in the Tropidurini; Figs 10–11). It is distinguished from *S. dumerilii*, *S. quinarius* and *S. squarrosus* (character states in parentheses) by the presence of a prominent, serrate vertebral crest (in contrast to a low vertebral crest); two, rarely 3, supraciliaries (4, rarely 3); ear-opening bordered anteriorly by a distinctly enlarged scale projecting over tympanum (no enlarged scale projecting over tympanum; Figs 12–17); dorsals distinctly keeled and mucronate (dorsals with a low keel, not or hardly mucronate); 9–10 scales across midbody from one dorsolateral row to the other (11–13 in *S. dumerilii*, 13–15 in *S. quinarius* and *S. squarrosus*); ventrals between anterior level of fore- and hind limbs 24–28 (28–32 in *S. dumerilii*, 30–34 in *S. quinarius*, 28–34 in *S. squarrosus*); scales on chin subequal and imbricate, or only most anterior ones smaller and subimbricate (scales on chin smaller, polygonal,

and subimbricate anteriorly, grading into larger, pointed, and imbricate posteriorly; Figs 18–22); tail 1.4–1.8 times SVL (1.2–1.4 times in *S. dumerilii*, 1.0–1.1 in *S. quinarius* and 0.8–0.9 in *S. squarrosus*); and color pattern (Table 1). From *S. tricristatus* it differs in presenting head width 0.78–0.89 times head length (0.96); 39–41 scales around midbody (33); and ear-opening bordered anteriorly by a distinctly enlarged, smooth scale (scale not larger than adjacent temporal scales, keeled). Moreover, it probably reaches a larger body size (adult males  $\geq 70$  mm in *S. canastra* sp. nov. versus 58 mm in the holotype of *S. tricristatus*).

**Description.** Tropidurid with a known maximum SVL in males of 77 mm (MZUSP 88873, holotype), and 65 mm in the only female known (MZUSP 88875). Head 24–25% of SVL, 1.1–1.2 times as long as wide, 1.2–1.3 times as wide as high. Snout bluntly pointed. Canthus rostralis well defined, continuous with supraciliaries, which end in an enlarged, prominent scale, so that the head has the shape of a four-sided pyramid. Neck narrower than head and body. Body roughly cylindrical. Limbs well developed, forelimbs 42–46% of SVL, hind limbs 58–65% of SVL, tibia 15–17% of SVL. Tail nearly cylindrical to slightly compressed, 1.7–1.8 times SVL in the largest specimens (SVL 71–77 mm), 1.4–1.5 in the smallest specimens (SVL 42–65 mm).

Rostral roughly triangular, largest width three to four times the medial height, only barely visible from above. Postrostrals 4–5. Snout, supraocular, and interorbital regions covered with irregularly polygonal, subimbricate to juxtaposed, strongly



Figures 5–9. Lateral view of head of: (5) *Stenocercus canastra* sp. nov., MZUSP 88873, holotype; (6) *S. dumerilii*, MPEG 6036; (7) *S. quinarius*, MZUSP 94069, holotype; (8) *S. squarrosus*, MZUSP 94056, holotype; (9) *S. tricristatus*, MNHN 6825, holotype.

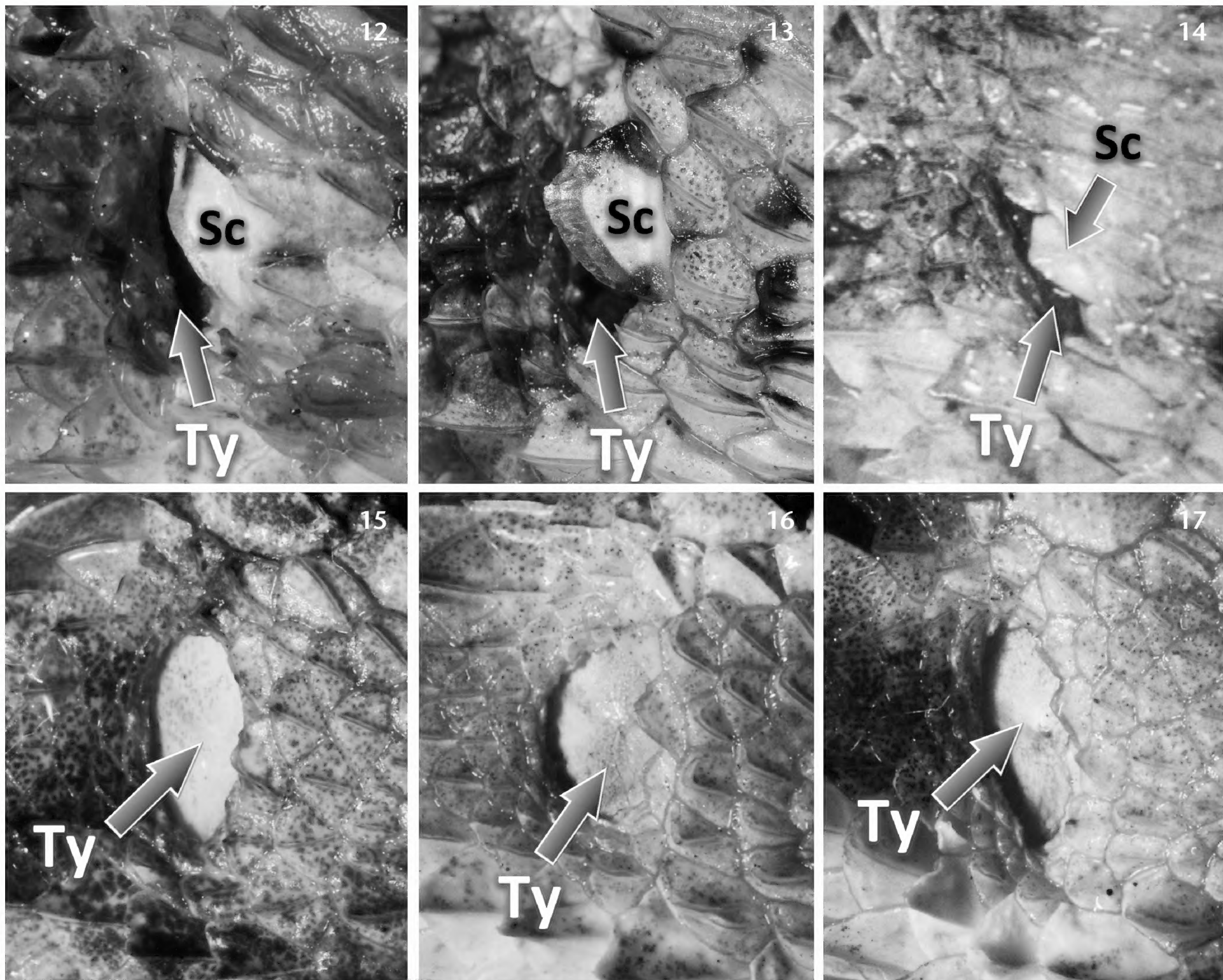


Figures 10–11. Dorsal view of head in (10) *Stenocercus canastra* sp. nov., MZUSP 88873, holotype; (11) *Stenocercus tricristatus*, MNHN 6825, holotype.

keeled scales, heterogeneous in size. Six scales between nasals, of which one supranasal at each side and four scales between them. Scales across the snout between canthals 3–5 (minimum number in a transverse row). One large canthal on each side, anteriorly in contact with two elongate, keeled scales (one of which is the supranasal); canthal posteriorly in contact with the first supraciliary. Supraorbital semicircle formed by 7–8 scales (between canthal ridge and post-supraciliary scale), of which the third and fourth, or only the fourth, are in medial contact; the posterior scale is the largest and most prominent, the second most anterior scale is often the second largest. Supraoculars irregularly polygonal, subimbricate, strongly keeled, none distinctly enlarged; 3–5 in a transverse line across the greatest width of each orbit. Two (three on the left side of MPEG 31738) elongate supraciliaries in contact with each other (narrowly overlapping), with a third supraciliary lateral to, and in contact with, the other two. Canthals and supraciliaries form a distinct ridge that ends in a very prominent pointed scale immediately posterior to supraciliaries; in the juvenile, MZUSP 94456, this scale is less prominent. This ridge delimits a sharp angle between dorsal and lateral surfaces of head. Interparietal moderately enlarged, roughly rhomboid or hexagonal, parietal eye distinct. Parietals about as large as, or smaller than interparietal; in some specimens separated from interparietal by small scales. Postparietals large

with a prominent keel, separated medially by small scales (in medial contact in MNHN 2014.0061). Other posterior head scales heterogeneous in size. Angulate temporals distinctly keeled, but not especially large or prominent (Fig. 10).

Nasals lateral to canthal ridge, undivided, separated from rostral by the postrostrals; nostril in posterior part of nasal, directed latero-posteriorly. Loreal region with a distinct row of lorilabials, anteriorly and posteriorly forming a single row of scales, medially a double row; between lorilabials and canthal ridge a few large (and in some cases a few small as well), irregularly polygonal scales, with small keels and/or variably rugose surface. Scales in a transverse row between canthal and supralabials, 4–5. An elongate subocular, preceded by a distinctly shorter pre-subocular, both keeled, the keels aligned and closer to the upper margin of the scales. Elongate subocular separated from supralabials by the row of lorilabials. Supralabials 5–6, very narrow and mostly with a keel on their lower margin. Temporal region with polygonal (mostly rhomboid to hexagonal), strongly keeled, imbricate scales, in approximately oblique rows; upper scales larger and distinctly more prominent (these scales are ventral to what was called by Cadle 1991 “angulate temporals”). Ear opening vertically oval, largely covered by an enlarged, smooth scale on its anterior margin; tympanum slightly recessed (Figs 5, 12, 13).



Figures 12–17. Ear region of: two specimens of *Stenocercus canastra* sp. nov.: (12) MPEG 31738, (13) MZUSP 88873, holotype; (14) *S. tricristatus*, MNHN 6825, holotype; (15) *S. dumerilii*, MPEG 6036; (16) *S. quinarius*, MZUSP 94069, holotype; (17) *S. squarrosus*, MZUSP 94056, holotype. (Ty) Tympanic membrane, (Sc) enlarged ear scale. Note the evident enlarged preauricular scale in *S. canastra* sp. nov., the relatively small and keeled preauricular scale in *S. tricristatus* and the virtual absence of this scale in *S. dumerilii*, *S. quinarius*, and *S. squarrosus*.

Mental relatively small, but larger than adjacent infralabials and the two or four post-mentals. Infralabials 5–7 (mostly 6), very narrow and keeled; followed by a relatively large, elongate, keeled scale. Scales on chin anteriorly polygonal, keeled, subimbricate, posteriorly (including gulars) mostly phylloid, distinctly keeled, mucronate, and imbricate, longer and with higher keels laterally. The keels of the phylloid scales are mostly aligned in longitudinal rows, which also continue along neck and belly; anteriorly on the chin these rows converge towards the mental. Gulars between ventral edges of ear-openings 11–14 ( $12.7 \pm 1.0$ ). No gular or lateral folds (Fig. 18).

Scales on nape relatively small, subimbricate, and keeled medially, dorsolaterally similar to dorsals but shorter, some

of them with a very prominent mucron. On sides of neck the mucron is similarly well developed, giving the neck a spinose appearance. Dorsals phylloid, keeled, mucronate, and imbricate, in approximately longitudinal rows. A prominent serrate vertebral crest of moderately enlarged, strongly keeled, and mucronate scales is present from nape to base of tail. A dorsolateral row of similar, but slightly smaller, scales on each side forms a lower, serrate crest also from nape to base of tail. A third, less prominent longitudinal crest, is present on each side, between fore- and hind limbs. Vertebral and dorsolateral crests usually separated by three scales in a transverse line at midbody, totaling nine scales from one dorsolateral crest to the other (10 scales in MZUSP 88875); dorsolateral and lateral

crests are separated by 4–5 rows of scales. Vertebral crest with 25–28 ( $26.2 \pm 1.1$ ) scales from occiput to posterior margin of hind limbs. Paravertebral scales between the same points 36–42 ( $39.7 \pm 2.3$ ). Ventrals similar to dorsals, but flatter and slightly larger, forming distinct longitudinal rows (the keels forming low longitudinal ridges); 24–28 ( $25.9 \pm 1.5$ ) ventral scales along a midventral line between anterior level of forelimbs and anterior level of hind limbs. Scales around midbody 39–41 ( $39.7 \pm 0.8$ ). Scales on preanal plate similar to dorsals, but slightly smaller. Mite pockets absent.

Scales at base of tail similar to dorsals and ventrals. Distally the scales grade into polygonal shapes and become arranged in transverse (slightly oblique) rows; the crests disappear, but the ridges formed by the keels, on the ventral surface, continue to the tip of the tail. No distinct verticils (which probably indicates that autotomic segments are absent).

Limbs with phylloid, strongly keeled, mucronate, and imbricate scales, similar to, or smaller and more elongate than, dorsals. The mucron is especially well developed on the upper aspects of hind limbs. Subdigital lamellae single, mostly tricarinate; 13–15 ( $14.0 \pm 0.8$ ) under fourth finger, 17–20 ( $19.0 \pm 1.2$ ) under fourth toe.

In life, ground color predominantly light brown, with several dark brown blotches. Borders of most of blotches deep dark brown followed by white to cream areas (Fig. 2). Main features are: (1) an irregular dark brown blotch on anterior part of snout, present or absent; (2) a very conspicuous, large, rhomboid dark brown blotch on posterior part of snout and anterior to supraocular region, present in all individuals; it may be irregularly bordered by a thin white line; (3) posteriorly, on post-parietal and supratemporal areas, either three relatively large, irregular dark brown blotches (medial one may have a shape grossly reminding of a butterfly), or four small dark brown blotches; (4) sides of head with a brown oblique band, bordered by dark brown, from below the eye to supralabials, and in some specimens one or two other similar bands posteriorly; (5) a series of 6–9 roughly triangular or rhomboid (a few irregular) dark brown spots along the vertebral region, from nape to level of hind limbs; intermediate dorsolateral spots are usually present; (6) sides of neck and flanks with irregular brown bands bordered by dark brown, usually separated by cream to light brown areas; (7) brown to dark brown spots form irregular bands across both limbs and tail, separated by wider (tail) or narrower (limbs) light brown spaces. Ventral region immaculate, dirty white to tan. In preservative, all colors tend to become darker.

Holotype main features. SVL 77 mm, tail length 132 mm, head length 19.0 mm, head width 16.7 mm, head height 13.6 mm, fore limb length 33 mm, hind limb length 45 mm, tibia length 12.5 mm. Scales around midbody 40. Vertebrae (from occiput to posterior margin of hind limbs) 27. Ventrals (between anterior margin of forelimbs and that of hind limbs) 28. Lamellae under fourth finger 15, under fourth toe 20. See also Figs 2, 5, 10, 13, 18.

Distribution. *Stenocercus canastra* sp. nov. is only known from Serra da Canastra National Park, Minas Gerais, Brazil (Figs 23–24). Besides the type series, two additional individuals of *S. canastra* sp. nov. were observed, but not collected, in an area very close to (less than 1 km N) the type-locality (O. Marini, pers. comm.).

Etymology. The specific epithet *canastra* is a noun in apposition and refers to the mountains ('Serra da Canastra') where all specimens were collected.

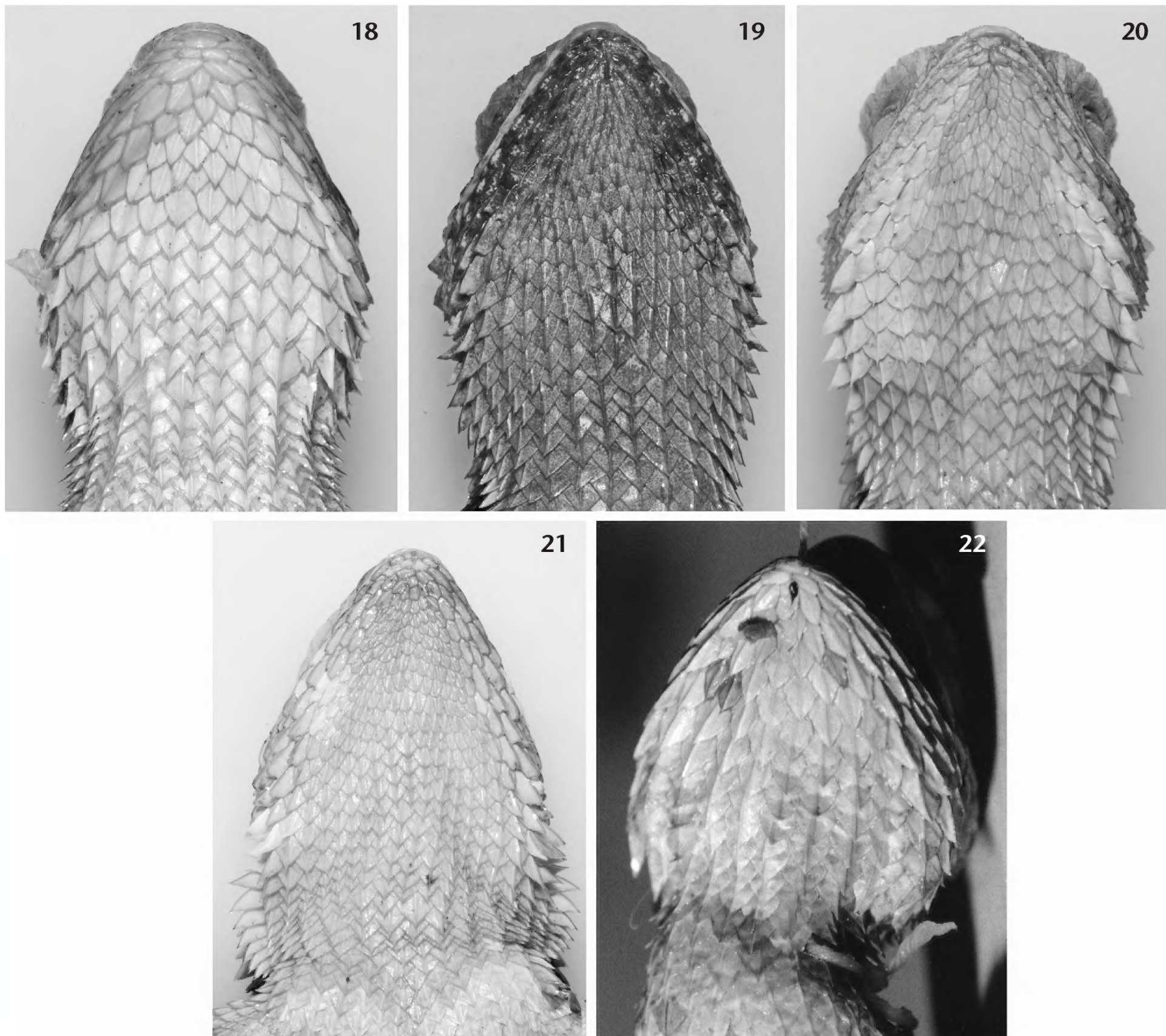
Habitat and natural history. These lizards were found in two localities 18 km apart, at Serra da Canastra National Park, in Minas Gerais, southeastern Brazil. Elevation varies from 800 to 1507 m. The vegetation is characterized by savanna-like 'cerrado', grass/shrubland on deep, well-drained soil ('campo limpo' and 'campo sujo') and on rocky, shallow soils ('campos rupestres'), and narrow strips of riparian forests. Dietz (1984) gives a general description of the vegetation in the area. *Stenocercus canastra* sp. nov. was only found in open cerrado formation with dense grass vegetation on deep, well-drained soil, between 1350–1410 m. It was not found in areas with rocky quartzitic soil/sandy soil and on rock outcrops, which cover a large portion of the park. Six specimens were on or inside termite mounds – all six found in about one hour, after a fire. The juvenile was obtained in a pitfall trap in campo limpo. Scales of *S. canastra* sp. nov. were found in scats of the omnivorous maned wolf (Canidae), *Chrysocyon brachyurus* (Illiger, 1815) (Queirolo and Motta-Junior 2007).

### *Stenocercus tricristatus* (A. Duméril, 1851)

*Ophryessoides tricristatus* A. Duméril (in Duméril and Duméril 1851): 66 (holotype MNHN 6825, type-locality: 'Brésil'); Duméril et al. 1854: 267; A. Duméril, 1856: 531; Etheridge 1966: 89; Peters and Donoso-Barros 1970: 215 (part); Fritts 1974: 35 (part). *Liocephalus tricristatus*; Boulenger 1885: 170. [*Stenocercus*] *tricristatus*; Frost 1992: 43 (part). *Stenocercus tricristatus*; Torres-Carvajal 2007a: 161, 2007b: 317. non *Ophryessoides tricristatus*; Cunha 1981: 4.

Material examined. Holotype, MNHN 6825, M, Brazil, leg. Claussen.

Diagnosis. *Stenocercus tricristatus* is characterized by the following combination of features: (1) Dorsal head scales keeled. (2) Interparietal distinct, moderately enlarged; posterior head scales variable in size. (3) Internasals six. (4) No distinctly enlarged supraoculars. (5) An enlarged canthal at each side, in contact anteriorly with two elongate scales that form a double canthal ridge. (6) An enlarged, prominent, obtusely pointed scale immediately posterior to supraciliaries; no projecting, blade-like, angulate temporal scales. (7) Gulars and ventrals distinctly keeled. (8) Parietal eye distinct. (9) Neck folds absent. (10) Dorsals phylloid, keeled, mucronate and imbricate; scales on flanks similar to dorsals. (11) A moderately prominent, serrate vertebral crest, and a slightly less prominent dorsolateral crest (a less conspicuous lateral crest may be present, but it is not very clear from the present condition of the specimen). (12) Mite

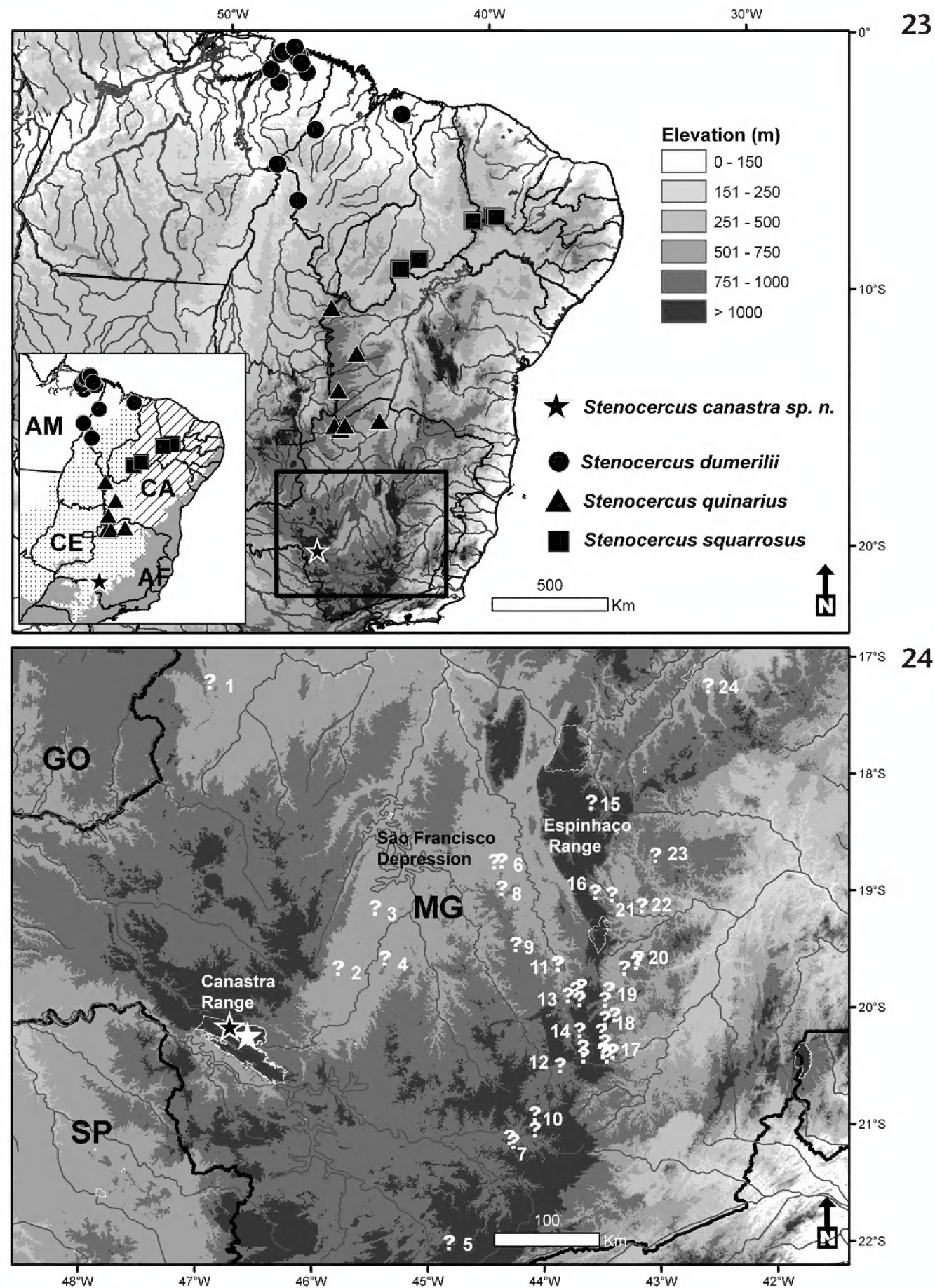


Figures 18–22. Ventral view of head of: (18) *Stenocercus canastra* sp. nov., MZUSP 88873, holotype; (19) *S. dumerilii*, MPEG 6036; (20) *S. quinarius*, MZUSP 94069, holotype; (21) *S. squarrosus*, MZUSP 94056, holotype; (22) *S. tricristatus*, MNHN 6825, holotype.

pockets absent. (13) Scales on posterior surface of thighs imbricate, keeled. (14) Tail moderately compressed, verticils absent. (15) Dorsal coloration probably with numerous dark brown spots on back and flanks; head with at least a large, triangular spot on posterior part of snout. (16) Scales around midbody 33, ventrals between anterior margin of forelimbs and anterior margin of hind limbs 23. (17) No distinctly enlarged scale on anterior margin of ear-opening.

*Stenocercus tricristatus* is distinguished from all other *Stenocercus* except *S. canastra* sp. nov., *S. quinarius*, *S. squarrosus* and *S. dumerilii* by the presence of an enlarged, prominent post-su-

praciliary scale; from all others except *S. canastra* sp. nov., *S. quinarius* and *S. squarrosus* by a moderately enlarged interparietal (although not as large as in the Tropidurini). It is distinguished from *S. dumerilii*, *S. quinarius* and *S. squarrosus* (character states in parentheses) by the presence of a prominent, serrate vertebral crest (in contrast to a low vertebral crest); two supraciliaries (4, rarely 3); absence of two distinctly enlarged upper temporals (two distinctly enlarged upper temporals); preauricular scale projecting over the tympanum, keeled (preauricular scale not or only slightly projecting over the tympanum, smooth); dorsals distinctly keeled and mucronate (dorsals with a low keel,



Figures 23–24. Distribution of the new species and related horned *Stenocercus*: (23) Distribution according to altitudinal variation. Inset – Distribution in major Neotropical phytogeographic domains. (AM) Amazonia; (CA) Caatinga; (CE) Cerrado; (AF) Atlantic Forest. (24) Enlarged area around the type-locality of *Stenocercus canastra* sp. nov. (white star = type-locality, black star = Chapadão da Zagaia), showing major massifs (above 1000m, in dark grey) and the São Francisco depression (light grey). White “?” represent localities visited or mentioned in Claussen (1841), Castelnau (1949) and Luna (2007). Localities are numbered from West to East, with groups of clustered localities represented by a single number: (1) Paracatu; (2) Baú; (3) Abaeté; (4) Extrema; (5) Bananal; (6) Curvelo, Fazenda Porteirinhas (farm owned by Claussen), and Piranga; (7) Brumado and São João Del Rei; (8) Maquiné; (9) Sete Lagoas, Fazenda Melancias (farm owned by Claussen); (10) Prados and Lagoa Dourada; (11) Santa Luzia and Lagoa Santa; (12) Congonhas do Campo; (13) Sabará, Cuiabá, Morro Vermelho and Serra da Piedade; (14) Cachoeira do Campo (includes farm owned by Claussen), Gongosco and São Vicente; (15) Serro do Frio; (16) Itacolomi de Mariana; (17) Ouro Preto, Sumidouro and São Sebastião; (18) Mariana, Bento Rodrigues, Caraça and Catas Altas; (19) Brucutu; (20) Itabira, Chapada and Santana; (21) Ouro Fino; (22) Santa Rita; (23) Pinheiro; (24) Minas Novas. Protected areas are shown as light polygons. (MG) Minas Gerais state; (SP) São Paulo state; (GO = Goiás state.

not or hardly mucronate); 7–8 scales across midbody from one dorsolateral row to the other (11–13 in *S. dumerilii*, 13–15 in *S. quinarius* and *S. squarrosus*); ventrals between anterior level of fore- and hind limbs 22 (28–32 in *S. dumerilii*, 30–34 in *S. quinarius*, 28–34 in *S. squarrosus*); scales on chin subequal and imbricate (scales on chin smaller, polygonal and subimbricate anteriorly, grading into larger, pointed, and imbricate posteriorly); tail 1.7 times SVL, slightly depressed near base (at most 1.4 times, compressed near base); and color pattern (Table 1). From *S. canastra* sp. nov. it differs by its wider head when seen from the ventral side (0.96 times as wide as long versus 0.78–0.89 times); 33 scales around midbody (39–41); preauricular scale about as large as adjacent temporals, keeled (distinctly larger, smooth); and no pre-subocular larger than adjacent scales (a larger pre-subocular in *S. canastra* sp. nov.). Besides, it reaches probably a smaller adult size (57 mm versus  $\geq 70$  mm in adult males of *S. canastra* sp. nov.).

**Redescription.** Holotype. The holotype and only known specimen of *S. tricristatus* is an adult male (as evidenced by the distinctly swollen base of the tail) with the following measurements: SVL 58 mm, tail length 100 mm (1.7 times SVL), head length 14.1 mm (24% of SVL), head width 13.6 mm, head height 10.6 mm (head 1.04 times as long as wide, 1.28 times as wide as high), forelimb 28 mm (48% of SVL), hind limb 39 mm (67% of SVL), tibia 9.4 mm (16% of SVL). Snout bluntly pointed. Canthus rostralis well defined, continuous with supraciliaries, and followed by a prominent post-supraciliary, so that the head has the shape of a four-sided pyramid. Neck narrower than head and body. Body and proximal part of tail slightly compressed, tail distally cylindrical.

Rostral roughly triangular, largest width approximately four times the medial height, only barely visible from above. Postrostrals 4. Snout, supraocular, and interorbital regions covered with irregularly polygonal, subimbricate to juxtaposed, strongly keeled scales, variable in size. Six scales between nasals, of which one supranasal at each side and four scales between them. Scales across the snout between canthals 4 (including one small, asymmetrical). One large canthal at each side, anteriorly in contact with two elongate, keeled scales (one of which is the supranasal); canthal posteriorly in contact with the first supraciliary. Supraorbital semicircle formed by 6–7 scales (between canthal ridge and post-supraciliary scale), posterior scale largest; the third supraorbital scale on the left side is in medial contact with the fourth on the right side. Supraoculars irregularly polygonal, subimbricate, strongly keeled, none distinctly enlarged; three in a transverse line across the greatest width of each orbit. Two elongate supraciliaries in contact with each other (narrowly overlapping), with a third supraciliary lateral to, and in contact with, the other two. Canthals and supraciliaries form a distinct ridge that ends in a prominent, obtusely pointed scale immediately posterior to supraciliaries. This ridge delimits a sharp angle between dorsal and lateral surfaces of head. Interparietal moderately enlarged, roughly rhomboid, parietal eye distinct; at

each side a smaller parietal. Post-parietal region with irregularly polygonal and strongly keeled scales, heterogeneous in size: two relatively small scales immediately posterior to the interparietal, three moderately large (but smaller than the interparietal) scales on the left side, and two scales on the right side, of which the posterior is about as large as, or slightly larger than, the interparietal. No projecting angulate temporals (as described by Cadle, 1991; Fig. 11).

Nasals lateral to canthal ridge, undivided, separated from the rostral by the postrostrals; nostril in posterior part of nasal, directed latero-posteriorly. Loreal region with a distinct row of lorilabials, anteriorly and posteriorly forming a single row of scales, medially a double row; between lorilabials and canthal ridge a few scales of variable size, irregularly polygonal, with small keels and/or variably rugose surface. Scales in a transverse row between canthal and supralabials, 3–4. An elongate subocular, preceded by a small pre-subocular, both keeled, the keels closer to the upper margin of the scales, approximately aligned. Elongate subocular separated from supralabials by the row of lorilabials. Supralabials 5, very narrow and mostly keeled on their lower margin. Temporal region with polygonal (mostly rhomboid to hexagonal), keeled, imbricate scales, in approximately oblique rows, upper scales larger. The upper three scales in a row between the lateral side of the post-superciliary and the posterior margin of the head (in direction to, but not reaching, the ear-opening) are the largest and have a prominent keel. Ear-opening obliquely oval, anteriorly bordered by two main scales projecting over tympanum; the mid-anterior one is keeled and slightly larger than the one dorsal to it, but not larger than adjacent temporal scales; tympanum slightly recessed (Figs 9, 14).

Mental relatively small, only slightly larger than medial post-mentals. Four post-mentals, two of which very narrow, in contact with first and second infralabials at each side. Infralabials 6, very narrow and keeled. Scales on chin anteriorly polygonal, keeled and slightly imbricate, posteriorly (including gulars) phylloid, distinctly keeled, mucronate, and imbricate, the scales on the lateral rows slightly larger. The keels of the phylloid scales are mostly aligned in longitudinal rows, which also continue along neck and belly; anteriorly on the chin these rows converge toward the mental. Gulars between ventral edges of ear-openings 12. No gular or lateral folds (Fig. 22).

Scales on nape medially relatively small, subimbricate, and keeled, dorsolaterally similar to dorsals but shorter, some of them with a prominent mucron. Sides of neck with relatively large scales, each with a well-developed mucron. Dorsals and scales on flanks phylloid, keeled, mucronate, and imbricate, mostly in approximately longitudinal rows. A serrate vertebral crest of enlarged, strongly keeled, and mucronate scales is present from nape to base of tail. A dorsolateral row of similar, but slightly smaller, scales on each side forms a lower, serrate crest also from nape to base of tail. The presence of a third, less prominent longitudinal crest, on each side, between fore- and hind limbs, is dubious (throughout most of the body the external cuticle

is missing, which makes some characteristics less distinct, but the scales on this lateral row seem to be slightly larger than the scales on neighboring rows). Vertebral and dorsolateral crests are separated by 2–3 scales in a transverse line at midbody (7–8 scales from one dorsolateral crest to the other). Dorsolateral crest and lateral row of slightly enlarged scales are separated by four rows of scales. Vertebral crest with 27 scales from occiput to posterior margin of hind limbs. Paravertebral scales between the same points 34. Ventrals similar to dorsals, forming distinct longitudinal rows; 22 ventral scales along a midventral line between anterior level of forelimbs and anterior level of hind limbs. Scales around midbody 33. Scales on preanal plate similar to dorsals, but slightly smaller. Mite pockets absent.

Scales at base of tail similar to dorsals and ventrals. Distally the scales grade into polygonal shapes and become arranged in transverse (slightly oblique) rows; the crests disappear, but the ridges formed by the keels, on the ventral surface, continue to the tip of the tail. No distinct verticils (which probably indicates that autotomic segments are absent).

Limbs with phylloid, strongly keeled, mucronate, and imbricate scales, similar to, or smaller and more elongate than, dorsals. The mucron is better developed on the upper aspects of hind limbs. Subdigital lamellae single, mostly tricarinate; 14–15 under fourth finger, 18–19 under fourth toe.

Color pattern in the holotype has largely faded out, but the description (p. 531) and drawing (plate XXII, fig. 1) of Duméril (1856), together with what is still visible in the specimen, indicates that the color pattern would be similar to that of *S. canastra* sp. nov. (Fig. 1). According to the original description, the animal had a fawn color dorsally, with darker brown bands finely bordered by yellowish-white. The specimen at present has a tan ground color. A dark brown spot, with a thin black margin, on posterior part of snout and anterior to supraocular region is still very conspicuous; unlike that of *S. canastra* sp. nov. (which is rhomboid), the shape is triangular, pointing posteriorly (Fig. 11). On the posterior part of head there are three relatively small dark brown spots, arranged in a symmetrical way; the three together remind a stylized butterfly, with the central one (on the two scales behind the interparietal) representing the body, and the two lateral ones the partial contour of the wings. A dark band runs from lower margin of eye to labials. Between the vertebral and dorsolateral crests there are a few irregular, oblique, dark brown lines, in alternating positions left and right to the vertebral crest. Flanks with alternating tan and whitish vertical bands. Dark brown bands across hind limbs are still well visible, less so on the forelimbs. Color pattern on tail well preserved, proximally with middorsal irregular dark brown spots, each bordered by a thin black line, and lateral vertically elongate spots of similar color. Distally the middorsal and lateral spots fuse into transverse bands. Ventral region immaculate white under head and body, dirty white under limbs and tail.

Distribution. *Stenocercus tricristatus* was described by A. Duméril as coming from Brazil, with no further specification of

locality (Figs 23–24). However, the specimen had been collected by [Peter] Claussen (also spelled Clausen), a Danish who lived in Brazil for about 20 years. Even though he travelled to other places in his first years in the country, during most of his stay in Brazil he lived and owned farms in Minas Gerais, in Curvelo (Fazenda Porteirinhas; Luna Filho 2007) and in Cachoeira do Campo (Castelnau 1949), and all evidences indicate that his scientific contributions, including some geological publications and collections of fossils, plants and animals, refer to Minas Gerais, even though in many cases only “Brazil” is indicated as origin (British Museum 1904, 1906, Papavero 1971). Claussen visited and collected fossils at several of the caves where Peter W. Lund worked, mostly between Curvelo and Lagoa Santa, at the Rio das Velhas drainage, Minas Gerais (Luna Filho 2007). All these localities lie east of the São Francisco river, but he also visited areas (e.g., Abaeté) in the western margin of this river, for geological studies (Claussen 1841). In 1843 Claussen joined the expedition led by Count F. de Castelnau in Ouro Preto (Castelnau 1949) and left the expedition while still in Minas Gerais (according to a letter from Lund, in Luna Filho 2007). Although Warming (1880) indicates that Claussen accompanied Castelnau from Rio de Janeiro to Sabará, Castelnau’s report of the expedition in Brazil clearly states that they met in Ouro Preto, and Claussen is mentioned only while the expedition was travelling from Ouro Preto to Sabará, in the central portions of Minas Gerais (Castelnau 1949). No mention of Claussen is made later, while Castelnau travelled west, on his way from Sabará to Catalão, Goiás, central Brazil (Castelnau 1949). Papavero (1971: 91) mentioned the following localities visited by Claussen, all in the State of Minas Gerais: Ouro Preto, Cachoeira do Campo, Curvelo, Itabira, Itacolomi, Serra do Caraça, and Rio São Francisco. These data corroborate the idea that *S. tricristatus* comes from the State of Minas Gerais, most likely from its central, upland areas in or near the Espinhaço range, where most localities cited by Claussen are located, including the two farms where he lived while collecting in Brazil (Luna Filho 2007). Among the many localities visited or mentioned by Claussen, no localities are found in upland areas near Serra da Canastra, and all localities west of the São Francisco River are found in low lying areas, below 500 m.

Habitat. Unknown. Considering the possibility of its occurrence in Minas Gerais (see below) and data on other horned *Stenocercus*, it could be expected to occur either in cerrado vegetation or in shrublands on rock outcrops, both of which are widespread in these areas.

## DISCUSSION

*Stenocercus* is a complex and heterogeneous genus, with 68 species known at present (Uetz et al. 2017), of which ten occur in Brazil (Costa and Bérnills 2015). The five species studied here, however, differ from all other *Stenocercus* by the presence of a pyramidal head and enlarged, dorsally projected post-supraciliary. Torres-Carvajal 2007b, in a phylogeny of the genus

based on molecular and morphological characters, recovered *S. dumerilii* and *S. tricrostus* as sister taxa, but *S. quinarius* and *S. squarrosus* were not included in the analysis. Teixeira et al. (2016) constructed a new molecular phylogeny based on the same mitochondrial genes studied by Torres-Carvajal (2007b), where they included *S. dumerilii*, *S. quinarius*, *S. squarrosus* and also *S. canastra* sp. nov. (named *Stenocercus* cf. *tricrostus*). They recovered this latter species as sister to the clade (*S. dumerilii* (*S. quinarius*, *S. squarrosus*)), dating the divergence between *S. canastra* sp. nov. and the other three species in the Miocene, and among these three in the Pliocene/Pleistocene. In agreement with Teixeira et al. (2016), our data suggest that horned *Stenocercus* form two groups, one including *S. tricrostus* and *S. canastra* sp. nov., with body not or only slightly depressed, longer tails, and a serrated vertebral crest, among other characteristics, that occupies the southern portion of the horned *Stenocercus* distribution. The second group includes *S. dumerilii*, *S. quinarius* and *S. squarrosus*, with depressed body, shorter tails, and a low vertebral crest, and occupies the northern portion of the distribution.

*Stenocercus canastra* sp. nov. is most similar to *S. tricrostus*, which is also probably its geographically closest congener. In spite of the fact that *S. tricrostus* is only known from the holotype, the consistent differences between the series of *S. canastra* sp. nov. specimens and the holotype of *S. tricrostus*, especially in body size, shape of preauricular scales, head shape and number of scales around midbody (see Fig. 4, Table 1), indicate that they do not belong to the same species. Midbody scale counts in *S. tricrostus*, for instance, falls far outside the observed range in *S. canastra* sp. nov. Differences in snout-vent length and shape of the head could be explained if the holotype of *S. tricrostus*, with 57 mm SVL, would be a juvenile. However, it has a distinctly swollen base of tail, indicating well-developed hemipenes, which was confirmed by a small dissection at the base of the tail. Besides, the specimens of *S. canastra* sp. nov. varies from 42 mm to 77 mm SVL, among which the only female is 65 mm SVL. There is a male of 61 mm SVL which is a half-grown, and the remaining adult males are 71 mm SVL or larger. Finally, the only specimen from Serra da Canastra that has characteristics of a juvenile (SVL 42 mm), with disproportionate head and limbs in relation to body length, appeared far from the single specimen of *S. tricrostus* in our PCA (Fig. 4). Moreover, this juvenile specimen presents dorsal scales with less developed keels and longitudinal crests than adults of the same species, as well as in relation to the holotype of *S. tricrostus*, where dorsals are strongly keeled and mucronate (see Figs 1–3). Thus, the holotype of *S. tricrostus*, despite its small size, clearly differs from the juvenile of *S. canastra* sp. nov., indicating that differences between *S. tricrostus* and *S. canastra* sp. nov. are not due to ontogenetic variation. All other differences, in scale shape and numbers, are not known to vary with age or size. We also considered the possibility that some of the differences are due to the loss of the Oberhäutchen layer of the epidermis in the holotype of *S. tricrostus*. This may have affected in some way the shape of the post-supraciliary scale and

the lateral crest, but other scale differences, such as the larger size of the preauricular scale in *S. canastra* sp. nov., are not a result of such a loss. Two other characteristics may differ between the two species, but needs confirmation with the examination of additional (not yet available) specimens: the shape/size of scales on chin (as observed in Figs 18 and 22) and the shape, number and position of dark spots on head (Figs 10 and 11). Given all the evidence above, we conclude that *S. canastra* sp. nov. and *S. tricrostus* are two distinct species, diagnosed by a suite of meristic and morphometric characters.

*Stenocercus tricrostus* has not yet been assessed by the IUCN global red list (IUCN 2016). In Brazil, it was recently assessed as Data Deficient (DD) because its distribution is poorly known (ICMBio 2015). This assessment wrongly assigned specimens of *S. canastra* sp. nov. from Serra da Canastra deposited at the University of Brasília collection (CHUNB) to *S. tricrostus*; however, if corrected, this change would not affect its categorization. In relation to *S. canastra* sp. nov., the vegetation and soil types where the species was found covers at least 200 km<sup>2</sup> of the northern part of the Serra da Canastra National Park (SCNP). If this area were assumed as its Area of Occupancy (IUCN 2012), it would be a candidate for a threat category (Endangered) under criterion B. However, its known distribution is inside a well-protected national park and thus continuing decline in its population, distribution or habitat is not expected. Although bushfires are common at the SCNP, we found five out of the six specimens of the type series of *S. canastra* sp. nov. just after a fire; all individuals were hidden inside burrows and termite mounds, indicating that the species is not severely affected by bushfires (that are a natural feature of its habitat). Thus, at present, *S. canastra* sp. nov. should be assessed as Least concern.

Although *S. canastra* sp. nov. is known only from the northern portion of the park (Chapadão da Canastra), considering that the species is hard to find, it is possible that it occurs also in its southern part (Chapadão da Babilônia), that comprises 65% of the area of the SCNP (approximately 200,000 ha) and is still poorly known regarding lizard diversity. On the other hand, land tenure is regularized only in the northern part of the SCNP, while the southern portion is still under legal dispute. If this latter area is removed from the park, *S. canastra* sp. nov. might be affected.

The distribution in upland areas and plateaus is typical in Stenocercini (see Torres-Carvajal 2007b), and except for *S. dumerilii*, all other species of horned *Stenocercus* are found on uplands or plateaus with at least 500 m.a.s.l. *Stenocercus squarrosus* is typical of isolated upland areas (Serra das Confusões, Araripe and Ibiapaba complex, see Fig. 23) scattered in the predominantly lowland Caatinga, while *S. quinarius* is largely confined to the Serra Geral plateau, a large sandstone tabletop in the eastern portion of the Cerrado (Nogueira and Rodrigues 2006, see Fig. 23). Minas Gerais is a state with a very complex topography and geomorphology (see Castelnau 1949), with a number of hills and isolated plateaus with elevations above 800

m.a.s.l. and some peaks above 1800 m.a.s.l. Two upland blocks are largely separated by the São Francisco depression. Serra da Canastra, where *S. canastra* sp. nov. is found, lies to the west of the São Francisco depression, and Serra do Espinhaço, to the east. Although the exact provenance of the type specimen of *S. tricristatus* remains unknown, most localities mentioned by Claussen are clustered in a small upland portion of Minas Gerais, along Serra do Espinhaço (near Caraça, Ouro Preto, Cachoeira do Campo, Itacolomi), most above 1000 m.a.s.l. The few localities visited by Claussen west of the São Francisco river are in low lying areas, all below 500 m.a.s.l. (see Fig. 24). One possibility therefore is that these two species occupy different upland areas, separated by the São Francisco depression, where only a few localities are cited by Claussen and where the presence of horned *Stenocercus* species is unlikely. Such a pattern of upland open areas harboring a complex and diverse herpetofauna, mostly with allopatric ranges, has already been detected for Squamates in the Cerrado (Nogueira et al. 2011) and for snakes in the Caatinga region (Guedes et al. 2014). The pattern here inferred for Stenocercini in Minas Gerais is probably similar to that observed in closely related amphibians, that also show narrow ranged endemics in different plateaus in Minas Gerais and neighboring states, like the Hylidae *Oloolygon tripui* (Lourenço, Nascimento & Pires, 2009), known from Ouro Preto, Serra do Espinhaço (Lourenço et al. 2009), and *Oloolygon pombali* (Lourenço, Carvalho, Baêta, Pezzuti & Leite, 2013), from Serra da Canastra (Lourenço et al. 2013); and the Phyllomedusidae *Pithecopus ayeaye* (Lutz, 1966), from Serra da Canastra, Poços de Caldas, Minas Gerais, and Pedregulho, São Paulo (Araujo et al. 2007), and *P. megacephalus* (Miranda-Ribeiro, 1926), from Serra do Espinhaço, in Minas Gerais and Bahia (Brandão et al. 2012). Our findings, with two closely related species possibly found within a relatively small but topographically complex portion of south-central Minas Gerais, reinforce the importance of targeted, spatially accurate conservation strategies to safeguard the conservation of these isolated, easternmost allopatric components of Stenocercini, and highlight the relevance of taxonomic and distributional knowledge as basis for the conservation of the Neotropical herpetofauna, especially for its rare, restricted elements.

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